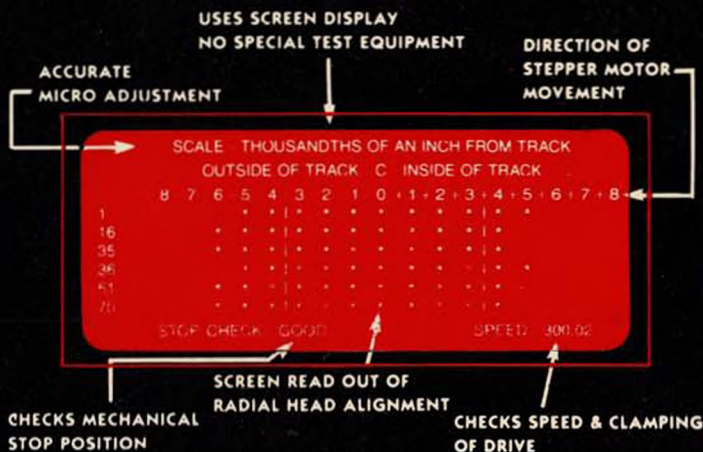


IS YOUR 1571 HEALTHY?
OR WOULD ITS PHYSICAL EXAM
LOOK LIKE THIS ONE?

1571 PHYSICAL EXAM



Package includes:

- True digital alignment disk with offset tracks

LIMITED WARRANTY NOTICE

CARDINAL SOFTWARE wants your continued business. If you fill out the enclosed product registration card and return it to us, you are covered by our product warranty. If your diskette should fail within 90 days of purchase, just return it directly to us with proof of purchase and we will replace it free. After 90 days, enclose \$17.00 plus \$3.50 shipping and handling with the defective diskette and return it to us for replacement.

SORRY, without the registration card you are not covered by the warranty. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

CARDINAL SOFTWARE, 14840 Build America Drive, Woodbridge, VA 22191 PHONE: (703) 491-6494 (MON-SAT 10-4 EASTERN STANDARD TIME)

WARNING!! WARNING!! WARNING!!

DO NOT ATTEMPT TO COPY THIS DISKETTE ! THERE IS NO PROTECTION ON THE DISKETTE, BUT A COPY PLACES ALL OF THE SECTORS BACK TO THE "ON TRACK" CONDITION SO THAT THE SPECIAL PROPERTIES OF THE "PHYSICAL EXAM" DISKETTE ARE LOST AND THE RESULTS WILL BE MEANINGLESS !!

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PHYSICAL EXAM

GENERAL REMARKS

The 1571 Disk Drive is relatively new and has many new features which seem well suited to increased reliability. There is no "FAILURE HISTORY" on which to base an assumption as to problems which may be encountered with this drive. The remarks that follow are based solely on the experience of the writer with drives of similar design.

- (1) This drive has a track 1 sensor so the loud hammering associated with the older 1541 drive should be greatly reduced.
- (2) The drive has a vastly improved power supply which should result in much less heat.
- (3) The drive has a direct drive (no belt) capstan so there should never be a speed adjustment problem, and different types of diskettes should perform equally well regardless of their "drag" (within reasonable limits).
- (4) The drive uses BOTH sides of the diskettes. This means twice the capacity on a diskette without having to add a notch and then turn the diskette over.
- (5) The speed of data transfer is somewhat faster under some of the operating modes.

All of these features are improvements on the older drives. If there are any disadvantages, the writer has not been able to find them as of this writing.

KEEPING OUT OF TROUBLE

No matter how reliable a piece of equipment proves to be, prudence suggests that there be a means for verifying its proper performance. The **PHYSICAL EXAM** diskette is designed to provide a method by which the performance of YOUR disk drive can be determined by YOU in YOUR environment without the use of any equipment other than the **PHYSICAL EXAM** diskette, the 1571 drive, and the C-128 or C-64 computer.

In addition this program permits making a permanent record of the performance so you can compare the performance from time to time, with that observed when the drive was "NEW". If there should be any gradual

deterioration due to misalignment, or other as yet unknown factors, such conditions should be detectable, hopefully, in time to take corrective action **BEFORE** disaster strikes.

**INSTRUCTIONS for TESTING
the 1571 DISK DRIVE
HOW TO USE THE PROGRAM**

SPEED AND CLAMPING TEST

Insert the diskette into the drive.

Type: Load"",8 press <RETURN>*

When the program has loaded,

Type: RUN press <RETURN>

The screen will display:

**TEST WHAT DEVICE #?
8?**

OR

Press 9 <RETURN> to test device #9 (if you have a second 1571 disk drive).

As previously noted, the speed control circuits of this drive are greatly improved over previous units. In fact there is not even an operator accessible speed adjustment, nevertheless it is worth while to check to verify that the speed circuits are performing correctly.

*To select the **SPEED TEST** press <F1>.*

The screen will now display the results of ten successive speed tests,

followed by a printout of the simple average of these ten measurements. The design center speed is 300 RPM. In all of the units seen to date, the speed will be within one RPM of this value and will not change more than .15 RPM from one measurement to the next. Since there is NO belt, any variation in the indicated speed must be associated with the **CLAMPING** of the diskette on the capstan (unless something is very wrong in the motor drive circuits).

If your drive does not perform the speed test, there is something wrong with the alignment. In such a case, you can still measure the speed by inserting a formatted diskette other than the **PHYSICAL EXAM** diskette (without a write protect tab). Run the speed test. The results will be displayed.

RADIAL ALIGNMENT

Run the **PHYSICAL EXAM** program and *choose* F3 from the menu. When this option is selected, the program will place a scale on the screen representing the recorded track and the adjacent area on each side of it. It will then read the test disk on which the sectors have been written "**OFF TRACK**" (using a specially constructed drive).

The program will display only those sectors that YOUR drive is able to read, and will print them at the proper place on the scale to show how far each sector is from the proper track.

For display purposes, the sectors are designated by the character "asterisk" (*). The diskette was formatted in the normal fashion with the head properly aligned. Seventeen sectors were then written with 253 characters consisting of the letters of the alphabet A through Q repeated 14 times plus the letters A through O recorded once.

Sector 0 was recorded "**ON TRACK**" but all of the other even sectors were recorded "**OFF TRACK**" in one thousandth of an inch increments so that sector 16 is actually eight one thousandths of an inch off the proper track. Similarly, all odd numbered sectors were recorded "**OFF TRACK**" on the other side of the proper track.

Since the 1571 disk drive is designed to use both sides of the diskette, the pattern described above is repeated on six tracks: 1, 16, 35, 36, 51, and 70. Tracks 1 to 35 are physically located on the bottom side of the diskette, while tracks 36 through 70 are on the top side of the diskette.

The screen display with a properly aligned drive will show that the drive can read equally well on both sides of the track. If the display shows that

the drive can read all the way out to the end on one side and only a few readings on the other side of the track, the operator should be aware that the drive is misaligned.

If the drive produces a well balanced display with all positions between the vertical "fences" filled in, the operator can rest assured that his drive is properly aligned. In this case the operator should make a permanent record of the display, and file it away for comparison with a retest at a later date. If at some time it can be seen that the pattern is gradually shifting, then one knows that the drive is going to require corrective action.

The screen display will usually show sectors far outside of the "fence" lines. Normally there will be 8 to 10 asterisks indicated on each track. This indicates that the drive is operating properly. If the track with the greatest number of asterisks contains less than 8 asterisks, it is likely that there is something wrong with the drive electronics, or that the diskette is not properly centered. Try removing and reinserting the diskette and then rerun the program.

TRACK 1 STOP ADJUSTMENT

The **TRACK 1 STOP** adjustment is very important. If adjustment is improper, the ability to interchange diskettes for use on other drives will be degraded and in fact may be impossible. At the completion of the alignment test, the **PHYSICAL EXAM** program will test the stop adjustment and print a message on the screen indicating its condition.

INSTRUCTIONS for READING TEST RESULTS

COMMENTS

In the following section we will present a number of typical displays. It is important to realize that the measurements being made are really quite precise—for example the distance represented by two adjacent asterisks is only one thousandth of an inch or about one third the thickness of the paper on the page you are reading. In order to speed up the display we have defeated all of the disk routines which reread the data in an attempt to verify proper data. Therefore what you observed on the screen will not be repeated exactly every time it is run. Also if the diskette is removed and reinserted, the pattern is likely to change. You will find however, that the general pattern will be consistently observed. Rarely will the difference be greater than one asterisk at the end of a line.

On the following pages are typical readings from several recent production drives. You will note that displays 2-5 are all a little different but all are OK. That is, all drives have all asterisks between the fences.

What you are looking for is that all tracks are symmetrical with respect to the center of the track, plus or minus one asterisk is the best you can expect. (Symmetrical is defined as: having the same number of asterisks on each side of the fence on a given line.)

There are variations between tracks for many reasons but they are all things we do not have control over. Do not worry unless each track is not symmetrical or there are asterisks missing between the fences.

You should make several readings before deciding that you should open the drive and adjust the alignment. Take out the disk between F3 commands. This will assure that the diskette is clamped OK and centered OK. Readings should not vary more than one asterisk on any one track on the same drive.

SAMPLE SCREEN DISPLAYS

PROBLEM: PHYSICAL EXAM diskette will not load. Your drive may be so far out of line (or otherwise defective) that it cannot read the diskette. In this case please try another drive. **SOLUTION:** If the alternate drive allows you to load the program, then go ahead and run these tests. If the program cannot be loaded on a second drive, return the diskette to **CARDINAL SOFTWARE** with a copy of your invoice within 90 days. You will receive a new copy. After 90 days, please return your diskette with a copy of your invoice and remit \$17.00 plus \$3.50 for shipping and handling.

TYPICAL SCREEN DISPLAY #1

```

SCALE=THOUSANDTHS OF AN INCH FROM TRACK
      OUTSIDE OF TRACK C INSIDE OF TRACK
-8-7-6-5-4-3-2-1-0+1+2+3+4+5+6+7+8
1  * * * * * I * * * * * I * * * * *
16 * * * * * I * * * * * I * * * * *
35 * * * * * I * * * * * I * * * * *
36 * * * * * I * * * * * I * * * * *
51 * * * * * I * * * * * I * * * * *
70 * * * * * I * * * * * I * * * * *
      STOP CHECK = GOOD   SPEED = 300.00

```

PROBLEM: Alignment has been run on a disk other than the **PHYSICAL EXAM** disk.

SOLUTION: Insert the **PHYSICAL EXAM DISK** and rerun the test.

TYPICAL SCREEN DISPLAY #2

SCALE=THOUSANDTHS OF AN INCH FROM TRACK

OUTSIDE OF TRACK C INSIDE OF TRACK

-8 -7 -6 -5 -4 -3 -2 -1 -0 +1 +2 +3 +4 +5 +6 +7 +8

```

1      * * I * * * * * * * I *
16     * * * I * * * * * * * I * * * * *
35     * * * * I * * * * * * * I * *
36     * * * I * * * * * * * I * * *
51     * * * * I * * * * * * * I * * * *
70     * * * I * * * * * * * I * * *

```

STOP CHECK = GOOD SPEED = 300.00

PROBLEM: This alignment is acceptable.

SOLUTION: Do not realign.

TYPICAL SCREEN DISPLAY #3

SCALE=THOUSANDTHS OF AN INCH FROM TRACK

OUTSIDE OF TRACK C INSIDE OF TRACK

-8 -7 -6 -5 -4 -3 -2 -1 -0 +1 +2 +3 +4 +5 +6 +7 +8

```

1      * * I * * * * * * * I
16     * * * I * * * * * * * I * * *
35     * * I * * * * * * * I *
36     * * I * * * * * * * I *
51     * * * * * I * * * * * * * I * * *
70     * * * * I * * * * * * * I * *

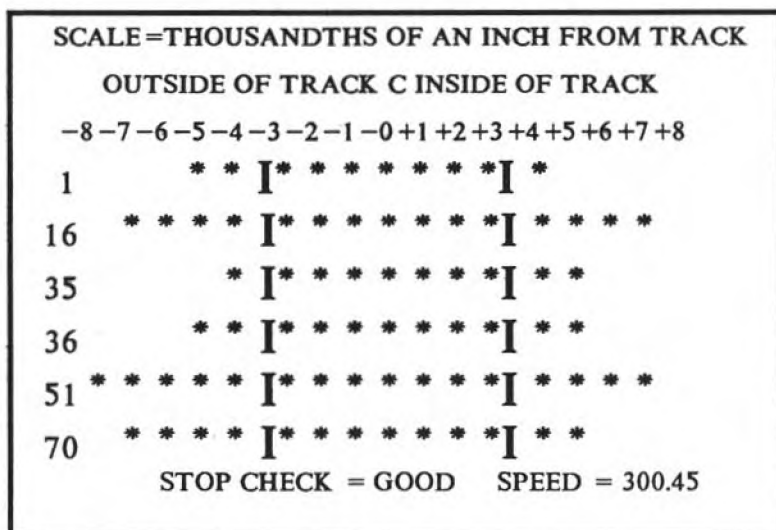
```

STOP CHECK = GOOD SPEED = 300.45

PROBLEM: This alignment is acceptable.

SOLUTION: Do not realign.

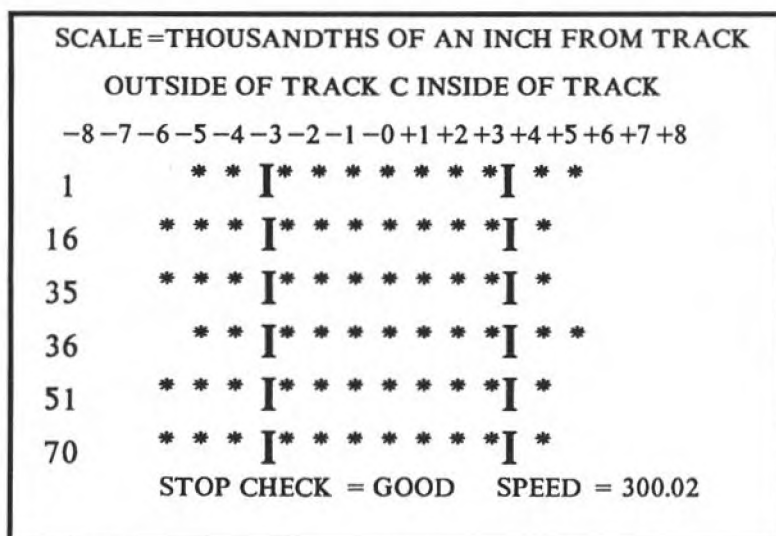
TYPICAL SCREEN DISPLAY #4



PROBLEM: This alignment is acceptable.

SOLUTION: Do not realign drive.

TYPICAL SCREEN DISPLAY #5



PROBLEM: This alignment is acceptable. The alignment is toward the outside but not enough to cause trouble.

SOLUTION: Do not realign.

TYPICAL SCREEN DISPLAY #6

SCALE=THOUSANDTHS OF AN INCH FROM TRACK

OUTSIDE OF TRACK C INSIDE OF TRACK

-8 -7 -6 -5 -4 -3 -2 -1 -0 +1 +2 +3 +4 +5 +6 +7 +8

```

1      * * * * I * * * * * * * I *
16     * * * * I * * * * * * * I *
35          * * * I * * * * * * * I
36     * * * * I * * * * * * * I *
51     * * * * I * * * * * * * I *
70          * * * I * * * * * * * I
      STOP CHECK = GOOD   SPEED = 300.03

```

PROBLEM: Alignment is at the limit towards the outside.
Do not adjust unless you are having problems.

SOLUTION: Reinsert the diskette and see if it remains the same.

TYPICAL SCREEN DISPLAY #7

SCALE=THOUSANDTHS OF AN INCH FROM TRACK

OUTSIDE OF TRACK C INSIDE OF TRACK

-8 -7 -6 -5 -4 -3 -2 -1 -0 +1 +2 +3 +4 +5 +6 +7 +8

```

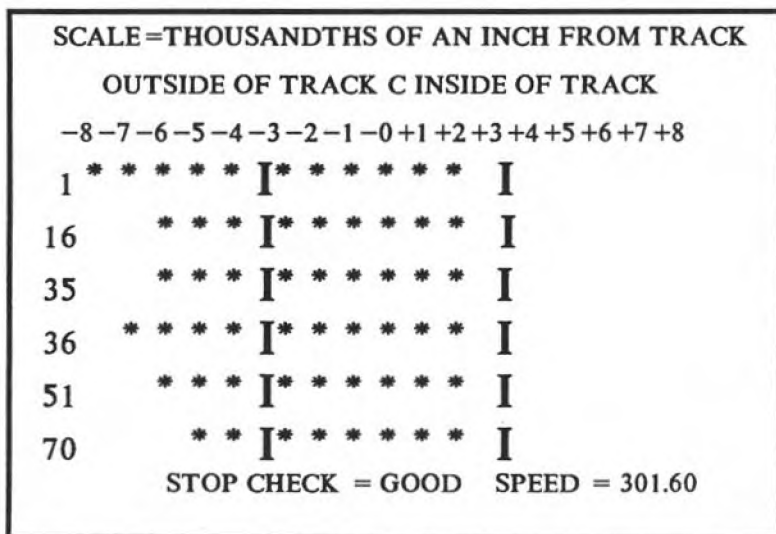
1              I * * * * * * * I * * *
16             I  * * * * * * * I * * *
35             I  * * * * * * * I * * * *
36             I  * * * * * * * I * * * *
51             I  * * * * * * * I * * *
70             I  * * * * * * * I * * *
      STOP CHECK = GOOD   SPEED = 299.85

```

PROBLEMS: Alignment is out on the inside by about .002 inches.

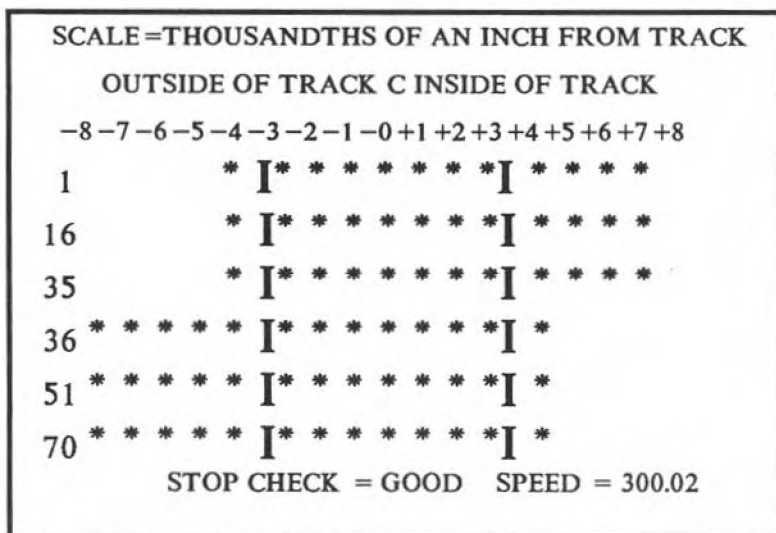
SOLUTION: Move the head toward the outside by .002 inches and retest.

TYPICAL SCREEN DISPLAY #8



PROBLEM: Alignment is outside by about .002 inches.
SOLUTION: Adjust the head toward the inside by .002 inches and retest. If speed needs adjusting, send the drive to an authorized repair center as speed is not adjustable by user.

TYPICAL SCREEN DISPLAY #9



PROBLEM: Alignment is different on the two heads.
SOLUTION: This adjustment is not recommended. Send to authorized repair center for repair.

TYPICAL SCREEN DISPLAY #10

SCALE=THOUSANDTHS OF AN INCH FROM TRACK

OUTSIDE OF TRACK C INSIDE OF TRACK

-8 -7 -6 -5 -4 -3 -2 -1 -0 +1 +2 +3 +4 +5 +6 +7 +8

```

1          * I * * * * * * I *
16         * * I * * * * * * I *
35         I          * * * I *
36 * * * * * I * * * * * * I * * * * *
51         * * I * * * * * * I *
70         I * * * * * * I
STOP CHECK = GOOD   SPEED = 300.03

```

PROBLEM: This result is typical of faulty head pressure.

SOLUTION: Stick a penny on the top head carrier with scotch tape and see if that fixes it. If so, increase head pressure.

TYPICAL SCREEN DISPLAY #11

SCALE=THOUSANDTHS OF AN INCH FROM TRACK

OUTSIDE OF TRACK C INSIDE OF TRACK

-8 -7 -6 -5 -4 -3 -2 -1 -0 +1 +2 +3 +4 +5 +6 +7 +8

```

1          I      * * * * * I *
16         * * I * * * * * * I *
35         * * I * * * * * * I *
36         I      * * * * * I *
51         * * I * * * * * * I *
70         * * I * * * * * * I *
STOP CHECK = GOOD   SPEED = 300.01

```

PROBLEM: Alignment is okay but stop is too close, preventing the head from reading the outside sectors of tracks 1 and 36.

SOLUTION: Move the Track 1 STOP as directed.

INSTRUCTIONS for the TECHNICIAN

RADIAL ALIGNMENT INSTRUCTIONS

If the **PHYSICAL EXAM** program shows that the disk drive is in fact out of alignment, the following procedures should be followed to restore it to alignment.

1. **REMOVE** the **PHYSICAL EXAM** diskette and put it in a safe place. **NOTE: Be sure to keep all diskettes away from tools like screwdrivers and pliers. Such tools are frequently magnetized enough to destroy the information on the diskette.**
2. Disconnect all cables from the disk drive. Now remove the small handle which is used to lock the diskette in place. Place a screwdriver behind the handle, close to the shaft and gently pry the handle off. You should place a piece of cardboard between the screwdriver and the front panel to prevent scratching the panel.
3. Turn the drive upside down and loosen the four phillips head self tapping screws. Now hold the top cover in place with your hands and turn the drive right side up allowing the four screws to fall out on the work surface.
4. It is a good idea to use a jar lid or some such small container to hold the handle and the various screws that will require removal.
5. Gently lift off the cover and put it safely aside. Next remove the front panel by simply tilting it forward and down.
6. The metal shield over the drive must now be removed. This is accomplished by removing the three phillips head (threaded) screws which hold it in place, and lifting it off. (see FIG.1)
7. Now you should stop and make a mental note of several things: *(1) You should note the length and type of screws removed and their locations so you can reassemble the drive properly. (2) You are now going to remove the plugs which connect the drive proper to the electronic circuit board. These MUST be properly identified. It is wise to make a small sketch of their locations and the wire colors so you will have no doubt about your ability to put them back in the right position.*

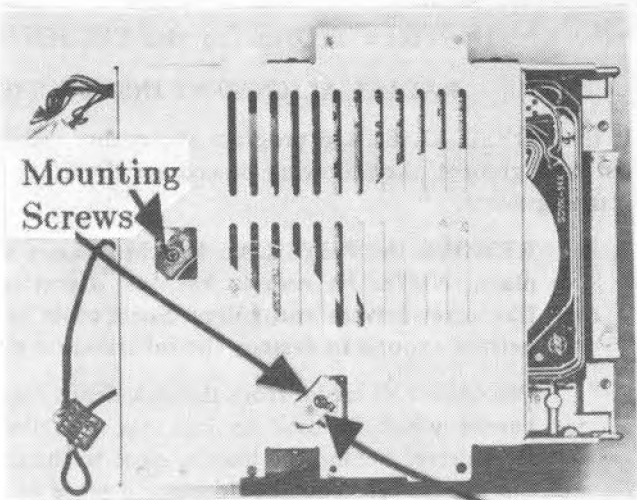


Figure 2 Put scratch mark here.

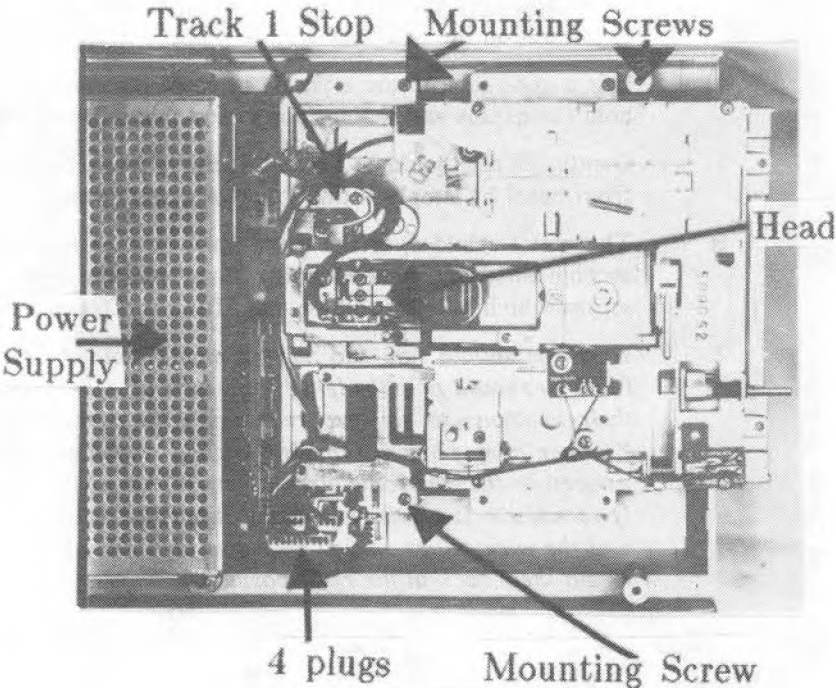


Figure 1

8. Again referring to FIG. 1, remove the four small plugs at the left rear corner of the drive proper. Also remove the R/W plug which is on the right side at the rear of the drive proper. This plug is laying flat against the circuit board slightly under the power supply. Use a pair of long nose pliers to reach this plug. Remove the screw holding two ground braids.
9. Now you can remove the four screws which hold the drive proper in the enclosure. **NOTE THAT THESE ARE SELF TAPPING AND ARE SHORTER THAN THE OTHER SELF TAPPING SCREWS REMOVED EARLIER!**
10. At long last you can lift the drive proper out of the enclosure. Turn it over and you will see the stepper motor and its mounting screws as shown in FIG.2.
11. **The first thing that must be done is to mark the present position of the stepper motor in such a way that you can be 100% certain of its original position.** A scratch made with a sharp scribe or similar instrument on the motor mounting bracket and the base casting should do the job.
12. Now remove one of the mounting screws and clean all of the "loktite" off of the screw and from the mounting ear and hole. Then replace the screw and do the same with the second screw.
13. Now you must reposition the motor in the direction and by the amount indicated in the screen displays. With the drive upside-down as shown in FIG.2, a clockwise rotation of the motor moves the R/W head toward the **INSIDE**. The amount of motion at the ear of the motor where the scratch was made should be approximately 10 times as great as that read off the screen display. So now you should loosen the two mounting screws just enough to allow you to turn the motor in the proper direction and by the estimated amount. Then retighten them.
14. Now, of course, the internal plugs must all be reconnected. Just lay the drive proper back in place and reconnect all of the plugs. **THE HEAVY GROUND BRAIDS MUST ALSO BE REPLACED.** It is not necessary that the front panel or the front panel indicator LED be reinstalled.
15. When everything is back in place, insert the serial bus and power plugs and turn the unit on. Insert the **PHYSICAL EXAM** program disk.

16. Now rerun the **PHYSICAL EXAM** program and compare the results with those observed previously.
17. If the adjustment is not correct, you should **REMOVE THE PHYSICAL EXAM DISKETTE**. Put it in a safe place. Now remove the power plug. You will have to loosen the motor screws and move the motor again. Now that you are familiar with the drive, you probably can turn it upside down on the power supply and make the adjustment without removing the plugs. **Be careful not to damage the wires however.** Repeat these procedures until you are satisfied with the alignment.
18. If the results seem to indicate that there is a problem with the "HEAD PRESSURE", (see **TYPICAL SCREEN DISPLAY #11**), you may want to examine the head pressure spring, (see **FIG.1**). The head pressure can be adjusted by bending this spring. You should be certain that this is the problem before you do so. A one cent piece taped to the top of the head is a good way to determine whether increading head pressure will be effective. If this is the case, use a pair of long nose pliers to bend the spring slightly. *Do not overdo it* since increased head pressure means more wear and tear on the diskette and the record head. You may also want to try cleaning the head with alcohol or one of the head cleaning kits available.
19. When completed, be sure the step motor screws are tight and then reassemble everything in reverse order of the disassembly.

TRACK ONE STOP ADJUSTMENT

FIGURE 1. shows the Track "1" STOP. This flat metal part is mounted by means of two phillips head screws as seen in the photograph. Adjustments are made by loosening both of the two screws and sliding the part toward the front or rear of the unit depending on the appearance of the display after running the alignment option:

- A. If the screen message says "STOP ADJUSTMENT - GOOD" then no adjustment is required.
- B. If the alignment part of the program shows that the "OUTSIDE" sectors of Track 1 and 36 cannot be read while the other tracks can, then the stop should be moved to the rear.
- C. If the alignment display looks "O.K." (i.e. is balanced), but the display says "STOP ADJUSTMENT - BAD", then the stop should be moved toward the **FRONT**.



Cardinal Software

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